

Application No.: 09/787,831
Amendment Dated: August 9, 2004
Reply to Office Action of: March 9, 2004

AMENDMENT TO THE CLAIMS

Please amend the claims as follows.

Claims 1-23 (Cancelled).

Claim 24 (Currently amended) Polymers comprising:

A) a hydrophobic polymer matrix

formed from a hydrophobic polymer incompatible with starch selected

from polymers of group (a) or group (b), wherein

the group (a) polymers are selected from the group

consisting of aliphatic polyesters, aliphatic-aromatic polyesters,

aliphatic polyamides, amide ester copolymers, urethane ester

copolymers, urethane amide copolymers, and urea ester co-

polymers; and

the group b) polymers are selected from the group

consisting of ethylene polymers and copolymers, crystalline

polypropylene polymers and copolymers, aromatic polyester resins,

polyamides, polyoxymethylene resins, polyphenylene oxide resins,

and polycarbonates;

B) a starch complex

further comprising (1) starch and (2) a complexing agent wherein the

starch complex is characterized by: being in the form of particles with a

numeral average size of less than 1 micron; a second-derivative IR

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absorption in the region of 940-950 cm⁻¹; and a solubility in 100 °C water of less than 20%;

C) a coupling agent

wherein the coupling agent contains groups compatible with the hydrophobic polymer matrix and the starch complex; and

wherein the starch complex is dispersed in the hydrophobic polymer matrix and is bound to the hydrophobic polymer matrix by reactive groups present in the starch complex capable of being fixed to the hydrophobic polymer matrix, with the proviso that, if the hydrophobic polymer matrix is formed from a hydrophobic biodegradable polymer selected from the group (a) polymers consisting of aliphatic polyesters, aliphatic-aromatic polyesters, aliphatic polyamides, amide ester copolymers, urethane ester copolymers, urethane amide copolymers, and urea ester copolymers; then the complexing agent is a different polymer than the hydrophobic biodegradable polymer that forms the hydrophobic polymer matrix and is also different than an ethylene - vinylalcohol copolymer.

Claim 25 (Previously presented) Polymers according to claim 24 wherein the hydrophobic polymer matrix is formed from a hydrophobic biodegradable polymer selected from the group consisting of aliphatic polyesters, aliphatic-aromatic polyesters, aliphatic polyamides, amide ester copolymers, urethane ester copolymers, urethane amide copolymers, and urea ester copolymers.

Claim 26 (Cancelled).

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Claim 27 (Previously presented) Polymers according to claim 24, wherein the complexing agent is different from the polymer forming the hydrophobic polymer matrix and is selected from the group consisting of polylactic acid, polyglycolic acid, poly(lactic-glycolic) acid copolymers, ethylene-acrylic acid copolymers, and ethylene-vinylacetate copolymers.

Claim 28 (Currently amended) Polymers according to claim 24, in which the quantity of starch complex dispersed in the hydrophobic polymer matrix in quantities of is from 0.5 to 50% by weight.

Claim 29 (Currently amended) Polymers according to claim 24, in which the starch complex is produced from compositions of starch with a complexing agent containing hydrophilic groups intercalated with hydrophobic sequences, wherein the starch complex is present and from which when treated with water at a 100°C under stirring a micro-dispersion of particles with numeral average diameters of less than 1 micron is formed by treatment in water at 100°C under stirring.

Claim 30 (Currently amended) Polymers according to claim 24, produced with ~~the use of~~ compositions having a water content of less than 20%, and higher than 2% by weight, and a Tg below 0°C.

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Claim 31 (Previously presented) Polymers according to claim 30, in which the complexing agent is selected from the group consisting of copolymers of ethylene with polar monomers.

Claim 32 (Previously presented) Polymers according to claim 31, in which the complexing agent is selected from the group consisting of copolymers of ethylene with vinyl alcohol, copolymers of ethylene with vinyl acetate, and copolymers of ethylene with acrylic acid.

Claim 33 (Previously presented) Polymers according to claim 32, in which the ethylene/vinyl alcohol copolymer contains from 50 to 75% of vinyl alcohol in moles.

Claim 34 (Previously presented) Polymers according to claim 30, in which the polymer which can complex with the starch is selected from copolymers from the group consisting of urethane ester copolymers, amide ester copolymers, aliphatic polyesters, aliphatic aromatic polyesters, and aliphatic polyamides.

Claim 35 (Currently amended) Polymers according to claim 24, wherein the starch complexing agent is a fatty acid ~~or a derivative thereof~~.

Claim 36 (Previously presented) Polymers according to claim 24, wherein the starch complexing agent contains reactive groups for the hydrophobic polymer matrix.

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Claims 37-41 (Cancelled).

Claim 42 (Currently amended) A method according to claim 52 40, in which the coupling agent is used in a quantity of from 0.5 to 10% by weight of the starch complex.

Claim 43 (Previously presented) A method for preparing polymers according to claim 24, comprising: melt-mixing the hydrophobic polymer forming the hydrophobic polymer matrix with the starch complex wherein the hydrophobic polymer is selected from the group consisting of aliphatic-aromatic polyesters, aliphatic polyamides, amide ester copolymers, urethane ester copolymers, urethane amide copolymers, and urea ester copolymers and the complexing agent is different from the hydrophobic polymer forming the hydrophobic polymer matrix and also from ethylene-vinylalcohol copolymers.

Claim 44 (Previously presented) A method according to claim 43 wherein the starch complex is preformed or formed during melt-mixing.

Claim 45 (Previously presented) Shaped articles obtained from the polymers of claim 24.

Claim 46 (Previously presented) Shaped articles obtained from the polymers of claim 24, wherein the hydrophobic polymer is selected from the group consisting of aliphatic polyesters, aliphatic-aromatic polyesters, urethane amide copolymers, urea ester copolymers, and urethane ester copolymers.

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Claim 47 (Previously presented) Films and compostable bags obtained from the polymers of claim 24.

Claim 48 (Cancelled).

Claim 49 (Currently amended) Polymers comprising:

A) a hydrophobic polymer matrix

formed from a hydrophobic polymer incompatible with starch;

B) a starch complex

further comprising (1) starch and (2) a complexing agent;

wherein the starch complex is characterized by: being in the form of particles with a numeral average size of less than 1 micron; a second-derivative IR absorption in the region of 940-950 cm^{-1} ; and a solubility in 100 $^{\circ}\text{C}$ water of less than 20%;

C) a coupling agent

wherein the coupling agent contains groups compatible with the hydrophobic polymer matrix and the starch complex; and

wherein the starch complex is dispersed in the hydrophobic polymer matrix and is bound to the hydrophobic polymer matrix by: i) the coupling agent, or ii) the coupling agent and reactive groups present in the starch complex capable of being fixed to the hydrophobic matrix, wherein the hydrophobic polymer matrix is formed from a hydrophobic polymer selected from the group consisting of ~~ethylene polymers and copolymers, crystalline propylene polymers and~~

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~~co~~polymers, aromatic polyester resins, polyamides, polyoxymethylene resins, polyphenylene oxide resins, polycarbonates, styrene-butadiene rubbers, polybutadiene rubbers, polyisoprene rubbers, ethylene-propylene and ethylene-propylene-diene rubbers, and natural rubber.

Claim 50 (Previously presented) Polymers according to claim 49, wherein the coupling agent is selected from the group consisting of vinyl silane, alkyl titanate, and bis-3-triethoxysilylpropyl tetrasulphide.

Claim 51 (Previously presented) A method for preparing polymers according to claim 49, comprising: mixing the starch complex, hydrophobic polymer, and coupling agent in a melted state or under hot mastication conditions.

Claim 52 (Previously presented) A method for preparing polymers according to claim 49, comprising: mixing the hydrophobic polymer and starch complex with rubber at a processing temperature between 140 and 160°C, in the presence of coupling agents.

Claim 53 (Previously presented) Shaped articles obtained from the polymers of claim 49.

Claim 54 (Previously presented) Shaped articles obtained from the polymers of claim 49, wherein the hydrophobic polymer is selected from the group consisting of aliphatic polyesters, aliphatic-aromatic polyesters, urethane amide copolymers, urea ester copolymers, and urethane ester copolymers.

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Claim 55 (Previously presented) Films and compostable bags obtained from the polymers of claim 49.

Claim 56 (Currently amended) Tires obtained from the polymers ~~rubbers~~ of claim 49.